

## DESIGN CRITERIA FOR STORM DRAINAGE FACILITIES

- DC4-001 GENERAL. Stormwater design for developments within the City of Gardner shall conform to the criteria provided in APWA Section 5600, latest edition and the criteria listed in the following paragraphs.
- DC4-002 STORMWATER MANAGEMENT PLAN. All preliminary plats and development plans submitted for approval to the City of Gardner must be accompanied by a Stormwater Management Plan. The Stormwater Management Plan must provide analyses and design for storm drainage facilities in accordance with the criteria as hereinafter described.
- DC4-003 MINIMUM DRAINAGE REQUIREMENTS. A minimum of 2 percent grade is required for positive drainage for all lot-to-lot developments. Due to the relatively flat topography in the City of Gardner, inlets shall be placed in subdivisions every 4 lots or less as needed, as determined by the City Engineer. Runoff from adjacent upstream properties shall be directed into swales or inlets as directed by the City Engineer.
- DC4-004 MINIMUM STANDARDS OF DESIGN. Storm water runoff shall be carried by enclosed systems or open channels on the basis of criteria established in this section and APWA 5600 subject to the final determination and approval of the City Engineer.

Enclosed drainage systems shall be used to collect and convey drainage on, across and through public right-of-way. The enclosed system shall extend at least to the limits of the right-of-way and energy dissipating structures shall be provided as needed to prevent erosion damage.

Where enclosed storm drainage is located along side property lines, it shall remain enclosed to the rear property line or an existing channel at least forty (40) feet beyond the rear corner of the adjacent buildings.

Existing open channels may remain along the rear or side of properties when the design provides adequate protection to the adjacent property. Such protection shall be through the provision of a 100-year floodplain setback and the stream buffers specified in Section DC4-007. Regardless of the stream or stream corridor size, buildings must maintain a minimum distance of 40 feet from the ordinary high water mark of a stream. Side slopes for open channels shall not be steeper than 3 horizontal to 1 vertical (3:1) for turf lining; however, 4:1 side slopes should be achieved when at all possible.

Pipes under streets shall not be allowed to daylight within the “Clear Zone” of the street, as defined in the AASHTO “Roadside Design Guide” unless waived by the City Engineer. Such a waiver shall be requested in writing. When the requirement is waived, appropriate safety measures shall be applied.

- A. Design Storm Frequencies. The minimum rainfall event to be utilized in determining the intensity of rainfall for storm flow calculations shall be based on the following:

	Storm Return
Land Use/Zoning	Frequency
Residential	10 Year
Commercial, Multi-Family	25 Year
Industrial	25 Year
Street Crossings	Per APWA 5600

- B. Pipe Sizing. The minimum size storm sewer shall be fifteen (15) inches in diameter.

All storm drainage systems shall be designed so as to maintain a minimum velocity at the outlet of three feet (3') per second and a maximum velocity twenty feet (20') per second when flowing full.

- C. Pipe Slope. Pipe with slopes greater than 10% shall be required to have concrete collars. The City Engineer will review spacing calculations from the design engineer for these conditions. Proof of proper abrasion resistance in pipe must also be provided.

- D. Depth. All storm drainage lines shall have a minimum cover of eighteen inches (18").

- E. Structures. The following minimum design standards shall be followed for stormwater structures, such as inlets, junction boxes, etc.:

- The minimum inlet or junction box size shall be 4 feet by 4 feet.
- The minimum distance from inner wall of the inlet or junction box to outside of pipe shall be 6 inches.
- All inlets shall be constructed outside of the curb radii.
- Driveways must be constructed a minimum of 2 feet from the flare of curb inlets.
- Grate inlets are not allowed unless approved by the City Engineer.
- Deflections in pipe shall not be allowed between structures.
- Any inlet, yard inlet, or junction box over 10 feet in length, 8 feet in width, or 12 feet in depth shall be considered non-standard and a detail provided designed and sealed by a structural engineer.

DC4-005 EASEMENTS. Permanent drainage easements shall be a minimum of fifteen feet (15') for enclosed structures or the outside width of the pipe or conveyance structure plus 10 feet, whichever is greater. Easements shall be centered on the pipe.

The City Engineer may require wider easements when other utilities are located within the same easement and/or when the depth of cover is greater than 4 feet.

DC4-006 **STORMWATER DETENTION.** Runoff from all developments shall be controlled by limiting the proposed stormwater release rate for the one percent (1%), ten percent (10%) and one hundred percent (100%) storm to the predevelopment peak flow rates for the 1%, 10% and 100% storm, respectively. If there are no existing flooding problems and flooding problems will not occur as a result of the proposed development as documented by a Stormwater Management Plan approved by the City Engineer, matching the proposed stormwater release rate to the predevelopment release rate for the 1% storm will not be required.

Per APWA 5600, to identify existing local flooding problems, the Stormwater Management Plan for a development project shall include an analysis of the existing downstream drainage system to the point the development's land mass is less than 10% of the total watershed. The City Engineer may require additional analysis of the downstream drainage system to identify flooding problems, especially in sensitive areas or where flooding has occurred downstream.

Stormwater detention requirements may be waived for infill sites if approved by the City Engineer. Prior to approval of a waiver, a Stormwater Management Plan shall be submitted to and approved by the City Engineer.

Stormwater detention shall be designed in accordance with APWA 5600 Section 5608. The basin shall be an amenity to the development with an aesthetic configuration and landscaping. Per APWA 5600, the water surface of the detention basin shall be a minimum of 20 feet from property lines and building structures. A greater distance may be necessary when the detention facility might compromise foundations or slope stability is a consideration.

DC4-007 **STREAM BUFFERS.** The City of Gardner has adopted the stream buffer requirements set forth in APWA 5600 Section 5605 as modified below.

<b>Contributing Drainage Basin Size (Acres)</b>	<b>Buffer Width From OHM*Outwards</b>
40 Acres To 160 Acres	60 Feet
160 Acres To 5,000 Acres	100 Feet
Greater Than 5,000 Acres	120 Feet

\*OHM=Ordinary High Water Mark as defined in APWA 5600.

If the floodplain is mapped by the Johnson County Stormwater Management Plan, then the buffer width as shown by Johnson County will govern. If the floodplain is within the bank

of the channel, an additional twenty-five feet (25') of buffer will be required from the top of bank in order to prevent development on the bank and subsequent erosion.

As stated in APWA 5600, no fill or grading activities shall be placed within the designated buffer zone.

DC4-008 DEVELOPMENT ACTIVITIES UNDER STATE AND FEDERAL JURISDICTION.

It is the responsibility of the design engineer to determine whether development activities fall under state or federal jurisdiction and to obtain applicable state or federal permits. Activities classified as a levee or floodplain fill project, channel change project, or dam or stream obstruction project can be subject to state jurisdiction requiring a permit. These activities are covered by K.S.A. 24-126 and K.S.A. 82a-301 to 305a. Projects in all three categories are also subject to environmental coordination review as required by K.S.A. 82a-325 to 327.

To obtain state and federal permits, plans and applications must first be submitted to the City of Gardner for review for general conformance to city standards. They will then be forwarded by the city to the appropriate division for state review and approval. The City of Gardner cannot approve plans for construction that are under state or federal jurisdiction until a state or federal permit is obtained.